Investment and Actions to Reduce Deforestation

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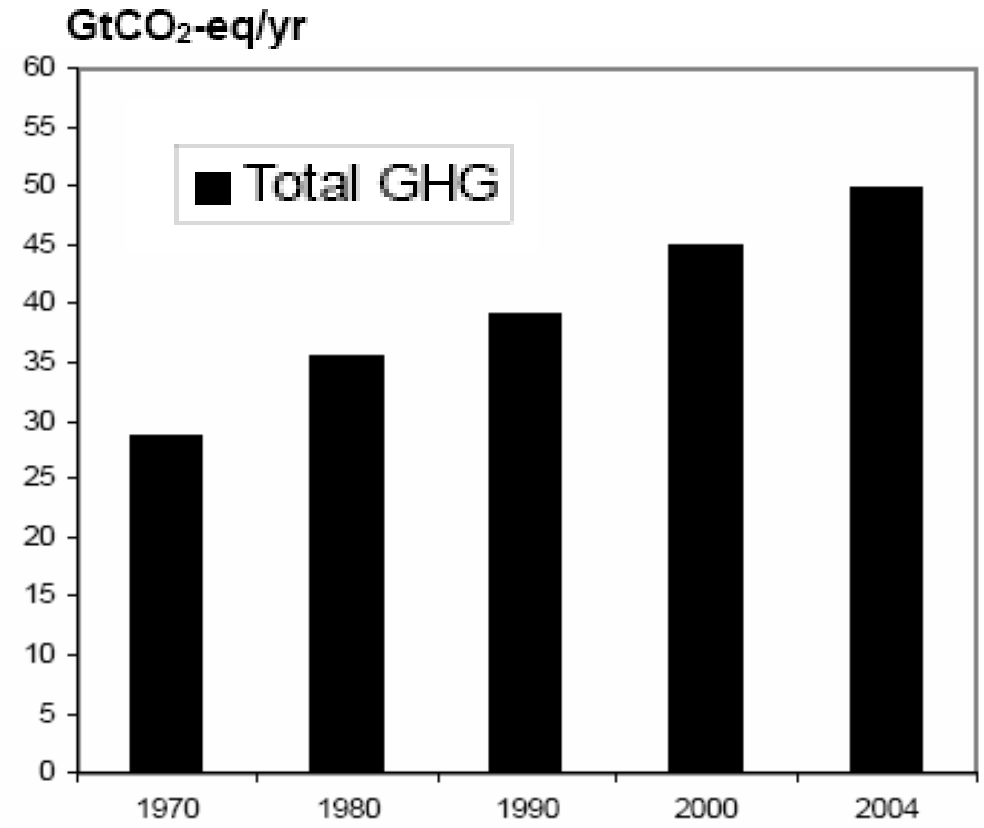
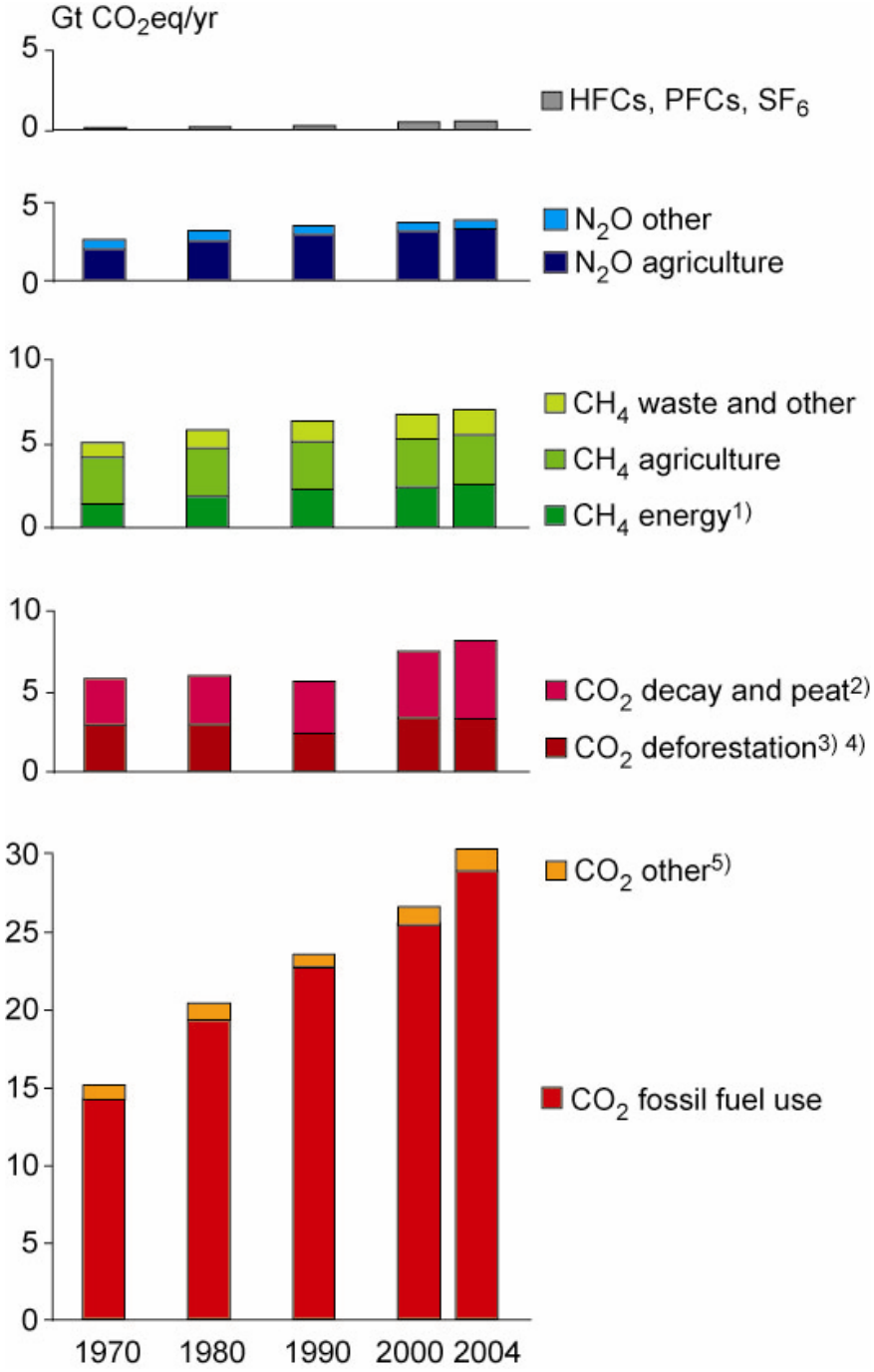


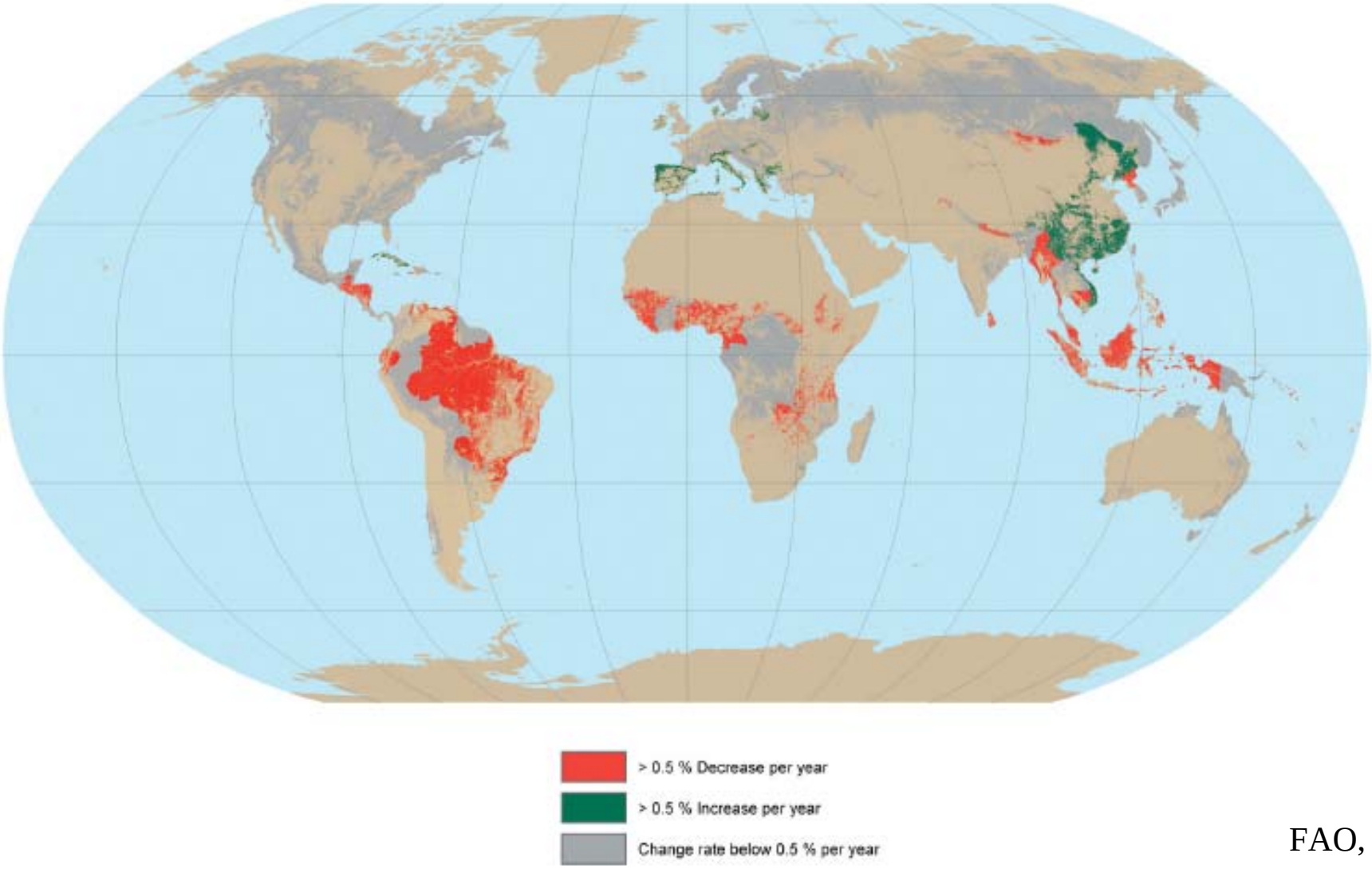
Carbon Dioxide Is the Largest Contributor



Source: IPCC AR4, May 2007

Areas with high net change in forest area between 2000 and 2005

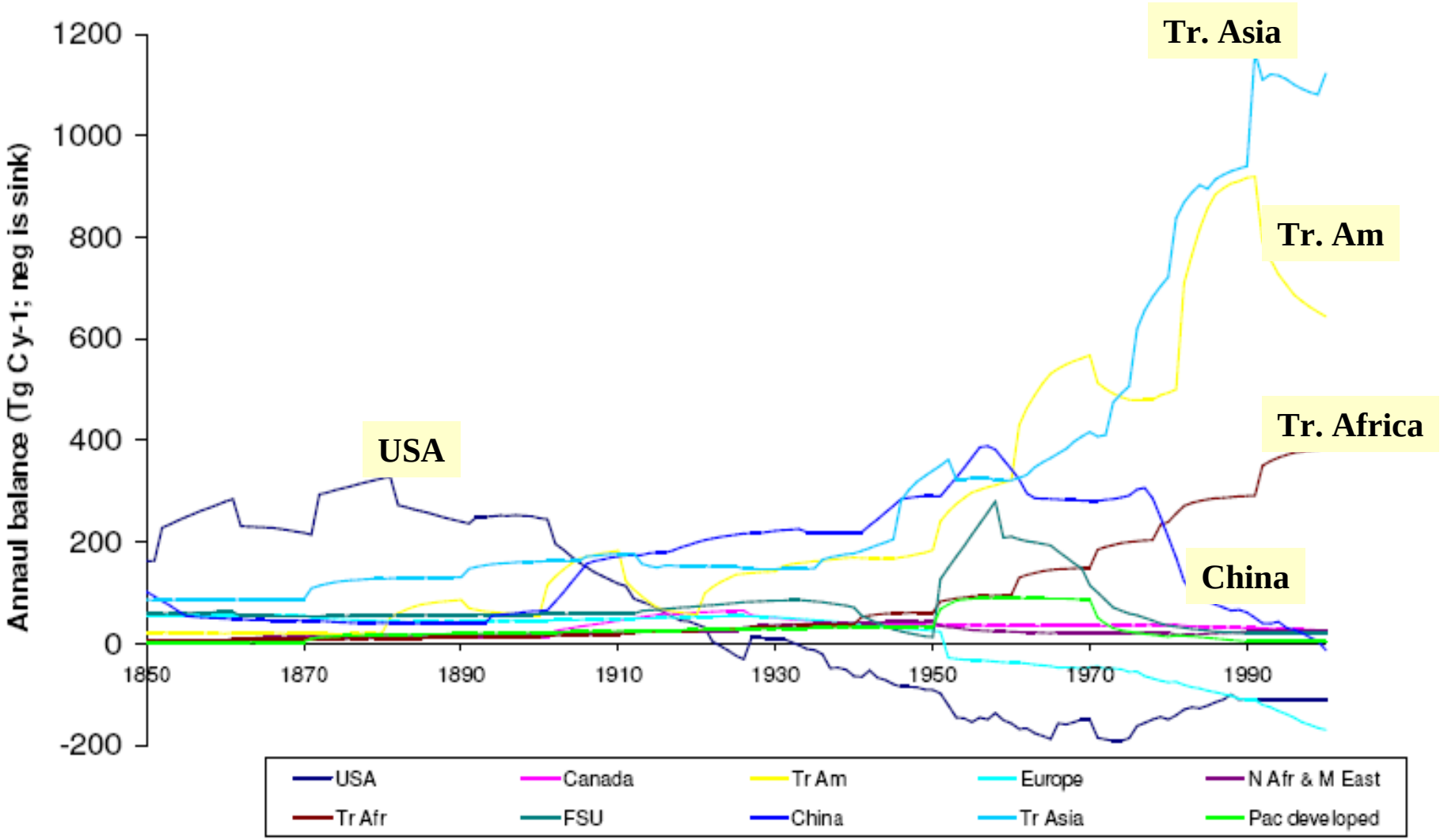
- Global forest cover -- 3,952 million ha, about 30 percent of the world's land area
- Net forest area loss was 7.3 million ha/yr compared to 8.9 million ha/yr in the 1990s



FAO, 2006

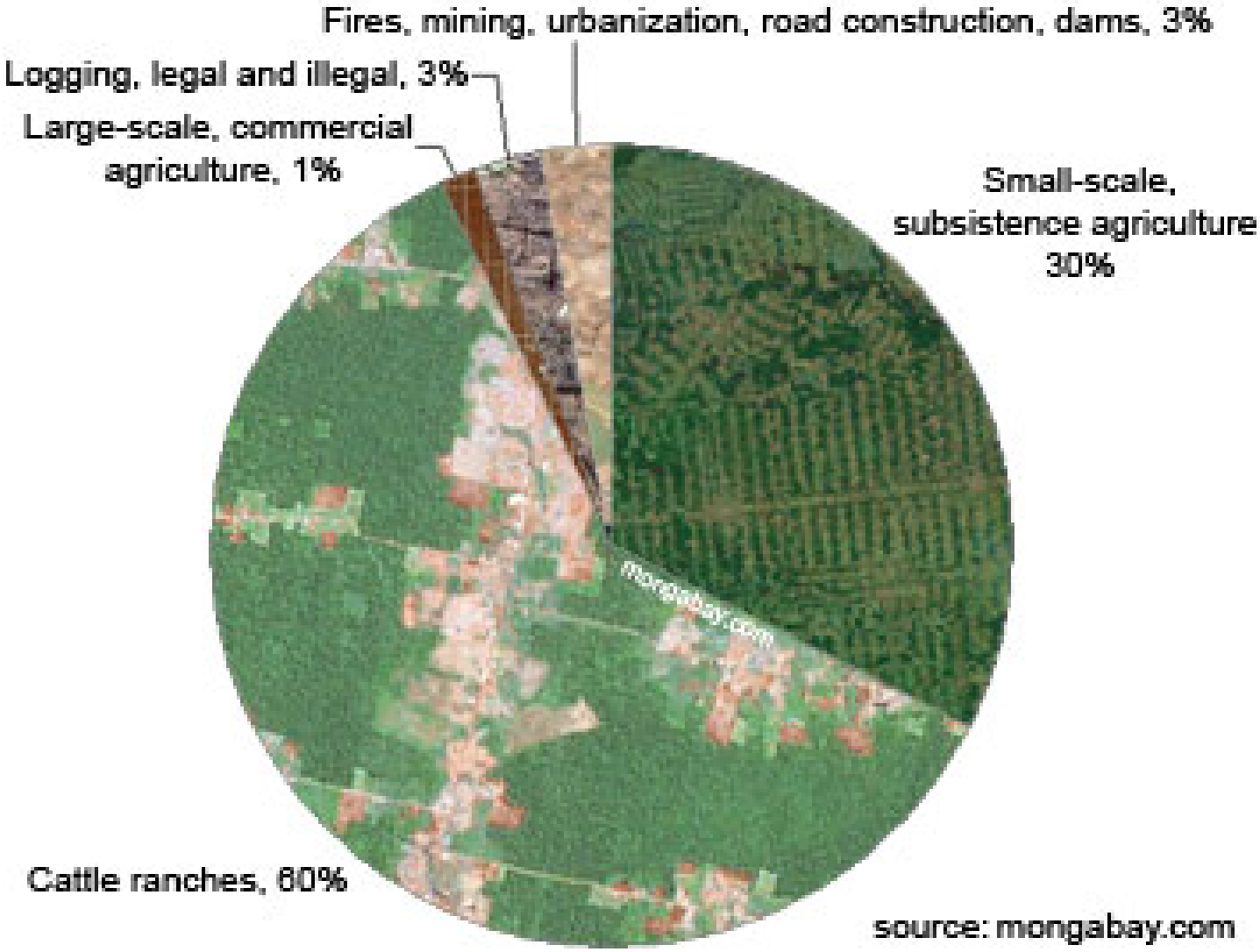
Carbon balance of the land use change and forestry sector: Significant changes can be achieved in C emissions

Positive Values = Emissions

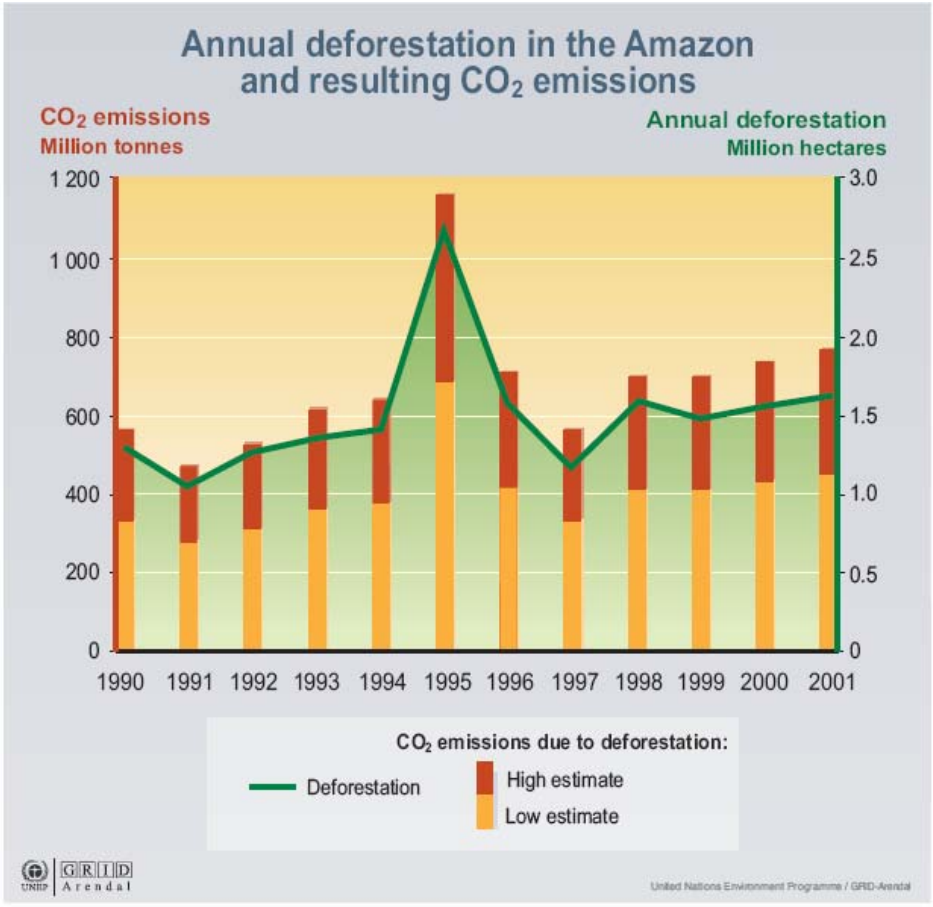


Source: Houghton (2003)

Causes of Deforestation in the Amazon, 2000-2005



Brazil Amazon Annual Deforested Area



Sources: UNEP 1999; La Rovere 2000; Cramer 2004.

Source: INPE, Brazil

How to model sharp fluctuations in base year deforested area?

Carbon choke price to virtually stop deforestation (i.e., C price > opportunity cost) varies across the tropics

- Carbon choke price to halt deforestation depends on opportunity cost of land and products
  - Timber and agricultural products fetch higher prices than land or other products
  - Higher the timber revenue higher the carbon price required to slow or avoid deforestation
- Feasibility of stopping deforestation complicated by many barriers.

Region	Carbon choke price to virtually stop deforestation ($/ t C)
Africa	$ 39
Central America	$ 127
South America	$ 147
Rest of Asia (Asia without China and India, incl. PNG)	$ 281

Sathaye et al. (2006) – GCOMAP Model Analysis

Results from Three Forestry Economics Models

DIMA (IIASA), GCOMAP(LBNL), and GTM (Ohio State University)

- For carbon prices of US$ 73/t C (US $20/t$CO_2$)
  - **Deforestation emissions reductions of 0.4 - 0.9 Gt C/yr could be obtained**
- 10% reduction in deforestation providing emission reductions of around 0.1 Gt C/yr in 2030 would cost **US$0.4 – US$1.2 billion/yr**
  - 50% reduction **– US$17.2-$28.0 billion/yr**
- Consistent with financial flows available through the **current CDM market ($4.2 billion in 2006, double the 2005 size)**, and ODA assistance
- Transaction costs are not explicitly considered

Analysis of Transaction Costs of 26 Offsets Projects Worldwide

- Projects include forestry, energy efficiency, renewable and conventional energy projects
- Transaction costs
  - Include project search, feasibility studies, negotiations, insurance, regulatory approvals, and monitoring and verification
  - Range from $0.11 per t C for large projects to $14.75 per t C for smaller ones
  - Weighted average of $0.95 per t C for all projects
  - Range from 1% to 19% of project costs for forestry projects

Source: Antinori and Sathaye (2007)

Many Successful National Programs to Reduce Deforestation

• Costa Rica, China, Philippines and Thailand have had successful national programs

- India National Program:
  - Joint Forest Management in India
  - 1980 Legislation – Forest Conservation Act
  - Forestry border areas managed jointly by forest rangers and local communities
  - Implementation and enforcement remains an issue with some states doing better than others

Globally non-climate policies, however, have had minimal impact in slowing tropical deforestation (IPCC AR4)

Carbon Market: Investors

- Purchase land for development either independently or in partnership with public entities
  - Could be done as part of a national program or offset projects activity
  - Lands may be developed to promote ecotourism or convert to managed forests
- **Example:** Noel Kempff, Bolivia
- **Partners:** Fundación Amigos de la Naturaleza, and four financial investors -- Government of Bolivia, American Electric Power, BP-Amoco, PacifiCorp, and others
- **Activities:** Expansion of the Noël Kempff Mercado National Park (from 0.75 Mha to 1.58 Mha), stopping logging through the indemnification of logging concessions within the park expansion area, and stopping deforestation through a sustainable development program for indigenous communities

Source: Nature Conservancy, 2007

Carbon Market: Purchasers of Carbon

- **Purchase carbon credits**
  - Program or project operation is done by contracted local entities
    - Companies under a mandatory or voluntary carbon cap may prefer this approach
- **Example:** CDM-type offset project, Scolel Te, Chiapas, Mexico
  - FIA, motor sports governing body, offsets the greenhouse gas emissions of the Formula One World Championship and the World Rally Championship
  - Other project partners include Mercycorps, Hunter-Clinton Foundation, Oxfam, and WWF

Scolel Té:

Location: Chiapas & Oaxaca, Mexico

Status: Fully Operational

Carbon offset potential: approximately 100,000 tCO_2/yr

Open for, investment: Yes **Direct purchase of credits:** Yes

Description: Scolel Té {'the tree that grows"} is the original Plan Vivo project. It now includes over 2000 families of indigenous Mayan and mestizo farmers in 30 communities in central and northern Chiapas and communities in the northeast of Oaxaca.

The main activities financed through the project are:

•Establishment of small plantations of high value native timber trees in tropical areas;

•Restoration of degraded pine-oak forest in upland areas;

•Protection and restoration of cloud forest.

Management & Technical Support: Administration and farmer support – AMBIO; Review and capacity building – ECCM; Science & technical specifications - El Colegio de la Frontera Sur; University of Edinburgh.

Research & Development Funding: UK-DFID; Instituto Nacional de Ecologia; IEA Greenhouse Gas R&D Programme

Current investors and recent purchasers: FIA Foundation; Future Forests (Pink Floyd); World Bank – IBRD.

Farmers participating in biomass survey

Women selecting fruit trees

Source: Plan Vivo, April 2007

Carbon Market: Brokers

- Create or provide access to a carbon market often through bundling of agroforestry and forest farmers to reduce transaction costs
- Examples: Timber and non-timber products, including tourism, from afforested land
- ITC, India – R&D, broker and purchaser

Preparing seedlings

Agroforestry – 9 month old

Eucalyptus 4-5 yr old

Carbon Market: R&D to Reduce Deforestation and Improve Carbon Sequestration

- Reducing deforestation may lead to displacement of dwellers
  - Intensive agroforestry and forestry activities can provide compensatory income
- Example – Mikro-Tek, Canada
  - Application and management of naturally occurring soil fungi "mycorrhizae" to increase C sequestration – could be used for intensive afforestation and planting of biofuel grasses

Carbon Market: Technical services for modeling, monitoring and verification

- New technologies needed for estimation, monitoring and evaluation of forest carbon stocks
  - Remote sensing, carbon flux modeling, micrometeorological observations
  - Availability of high resolution satellite images has improved
  - Use of radar and LIDAR (light detection and ranging) for estimating forest biomass
  - Above techniques will allow operations on a scale that drive down transaction costs
- Standard protocols are needed for using remote sensed data, tools and methods
- Quantifying accuracy and ensuring the use of consistent methods over time is more important

Source: IPCC AR4, 2007

Summary and Conclusions

- Drivers dictate types of policies and programs and to avoid deforestation
- Carbon finance can help by providing positive incentive to reduce deforestation
  - For modest reduction in deforestation, costs are well within current ODA and CDM transfers
- Transaction costs should be explicitly considered
- Leakage can be high – global monitoring is essential
- Monitoring and verification will be key to ensuring that carbon stocks are accurately measured
- National governments, private sector, public-private partnerships, and international organizations all need to play a role

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www.ies.lbl.gov

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Thank you